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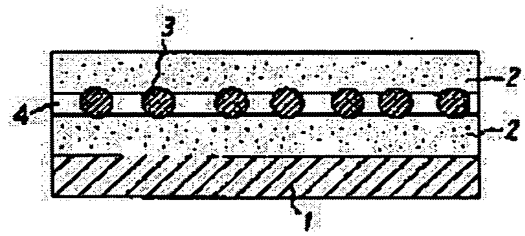
(71)Applicant : NIPPON KOKUEN KOGYO KK
(72)Inventor : MURATA KATSUHIRO
SHIBATA MITSUMASA
HATAKEYAMA TORU
ISONO TADAAKI

(54) MANUFACTURE OF THREE-LAYER STRUCTURAL ANISOTROPIC CONDUCTIVE FILM MEMBER

(57)Abstract:
PURPOSE: To improve the quality and operational reliability of a three-layer structural anisotropic conductive film member by laminating an insulating thermocompression bonding layer A consisting of a thermocompression bonding macromolecular binder, a silica group thixotropic agent and the like, a heat resisting flexible insulating film consisting of conductive fine-grained powder and the like, and the same material layer A as the former sequentially upon a fluorine group mould releasing film.



CONSTITUTION: A paint is prepared by mixing and dissolving 25.5wt% of phenolic resin, 74wt% of a mixed solvent comprising iso-phorone, methylisobutyl ketone and xylene mixed with one another in each equal mixing ratio by quantity, and 0.5wt% of a silica group thixotropic agent. The paint is applied on a Teflon (R) film 1 forming a separator, heated and dried to form an insulating thermocompression-bonded layer 2. Then a paint prepared by mixing 2wt% of the grained powder of resinous beads plated with nickel and yet gold, 28wt% of a flexible resin and 70wt% of xylene with one another is applied on the layer 2, heated and dried to form a further layer consisting of conductive grains 3 and a heat- resisting flexible insulating film 4, and yet another layer 2 of the same material as the former prepared through the same process as before is laminated on the further layer to form three- layer structure. These

processes can electrically and mechanically stabilize a three-layer anisotropic conductive member to improve the quality and reliability.

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CLAIMS

[Claim(s)]
[Claim 1] In manufacturing the adhesive 3 layer-system anisotropy electric conduction film member which made the conductive particle for connecting electrically and mechanically an electronic-parts connection terminal side face and another circuit board electrode terminal side face distribute (A) On the mold releasing film of a fluorine system, (b) phenol resin, an epoxy resin, 5 - 60 % of the weight of thermocompression bonding nature macromolecule binders which consist of one sort chosen from the group which consists of silicone resin, NBR special synthetic resin, acrylic resin, polyester resin, denaturation phenol resin, and styrene butadiene rubber, or two sorts, A (b) isophorone, diacetone alcohol, methyl isobutyl ketone, 60 - 90 % of the weight of one sort or two sorts or more of solvents chosen from the thermosetting resin and thermoplastics which consist of a xylene, toluene, diethyl carbitol, and a cellosolve acetate, (Ha) Thixotropy agent 0.1-1.0 of a silica system The insulating thermocompression bonding nature transparence coating which consists of transparence liquid with a viscosity of 10-1000poise which carries out the mixed (I + RO + Ha) dissolution of the weight % is coated. The process which carries out stoving and prepares an insulating thermocompression bonding layer, and (B) (a) Grain size of 1.0-40 micrometers Graphite powder, 1.0 - 10 % of the weight of one sort or two sorts or more of conductive impalpable powder chosen from the group which consists of the resin bead powder which carried out nickel plating, and also [silver powder, copper powder, nickel powder, gold plate nickel powder, pewter powder, and] gold-plated further, (b) Urethane resin, acrylic melamine resin, an epoxy resin, an alkyd resin, 5 - 50 % of the weight of one sort or two sorts of flexible resin chosen from the thermoplastics which has the thermal resistance which consists of polyester resin, chloroprene rubber system resin, neoprene system resin, and phenol resin, and thermosetting resin, It is a process (A) about the electric conduction anisotropy transparence coating carried out the mixed dissolution of the 50 - 95 % of the weight of the organic solvents, and conductive impalpable powder and mixed (a+b) homogeneity were made to distribute. The front face of a thermocompression bonding layer is coated. The process which carries out stoving and prepares a heat-resistant flexibility insulation film layer (A+B), (c) The process which coats and carries out stoving of the insulating thermocompression bonding nature transparence coating obtained at the process (A) to the topmost part of the coat of the bilayer obtained at said process (A+B) further, and is made into three layer systems (A+B+C), (d) The manufacture approach of the 3 layer-system anisotropy electric conduction film member which is formed at said process (A+B+C), has a thermocompression bonding layer in the maximum upper layer, and is further characterized by consisting of the process which cuts the 3 layer-system film which has an electric conduction anisotropy layer and the same thermocompression bonding layer by the desired die-length·width method with the maximum upper layer in the lower layer section at a middle lamella.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacture approach of a 3 layer-system anisotropy electric conduction film member of having the desired die length and the desired width method for many terminals being electrically put in block in a mechanical list, and connecting with a part for each terminal area which counters the electrode section of electronic devices, such as a liquid crystal panel, a plasma display, a thermal head, and a membrane switch, and a printed circuit radical plate edge child part with each at it.
[0002]
[Description of the Prior Art] As the manufacture approach of the conventional anisotropy electric conduction film, the front face of the mold releasing film which is a separator is coated with the thing which made mixing and homogeneity distribute a conductive particle, the anisotropy electric conduction film is formed after stoving into the insulating thermocompression bonding nature transparence coating which is a binder, and there is the approach of cutting by desired die length and a desired width method.
[0003]
[Problem(s) to be Solved by the Invention] The conventional anisotropy electric conduction film distributed the conductive particle in the adhesive film (binder), is inserted between the terminals which are going to connect this, and doubles and pressurizes [heat and] the location of an up-and-down terminal. The binder which forms the film between up-and-down terminals flows, and although the above things of extruding, and between up-and-down terminals being caught, contacting an electric conduction particle, and flowing have been used [when even a conductive particle flows like a binder and it connects highly minute circuits, such as a fine pitch, in the conventional thing at the time of heating application of pressure] For omission (what is depended on the configuration for a connection terminal area is included) of the conductive particle from a part for a connection terminal area, and the instability particle number by it, we are anxious about failures, such as variation in connection resistance, lifting or leak, and a cross talk, and it is left behind as a technical problem which should be solved. Therefore, the object of this invention solves the above technical problems, and is to offer the manufacture approach of an anisotropy electric conduction film member of having excelled the conventional anisotropy electric conduction film in dependability further at the quality list.
[0004]
[Means for Solving the Problem] The manufacture approach of the 3 layer-system anisotropy electric conduction film member of this invention First, it is (A) so that a drawing may also see. The mold releasing film of the fluorine system which is a separator, for example, 25 micrometers - 125 mum On the front face of a tetrafluoroethylene film or a TOYOFURON film (b) phenol resin, an epoxy resin, silicone resin, NBR special synthetic resin, 5 - 60 % of the weight of one sort or two sorts of thermocompression bonding nature macromolecule binders chosen from the thermosetting resin and thermosetting resin which consist of acrylic resin, polyester resin, denaturation phenol resin, and styrene butadiene rubber (SBR), 60 - 90 % of the weight of one sort or two sorts or more of solvents chosen from the group which consists of a (b) isophorone, diacetone alcohol, methyl isobutyl ketone, a xylene, toluene, diethyl carbitol, and a cellosolve acetate, (Ha) Thixotropy agent 0.1-1.0 of a silica

system The process which coats and carries out stoving of the insulating thermocompression bonding nature transparence coating which consists of the transparence liquid with a viscosity of 10-1000poise in which you mixed weight % (I + RO + Ha), and made it dissolve, and prepares an insulating thermocompression bonding layer, and [0005] (B) (a) grain size of 1.0-40 micrometers Graphite powder, silver powder, copper powder, 1.0 - 10 % of the weight of one sort or two sorts or more of conductive impalpable powder chosen from the group which consists of the resin bead powder which carried out nickel plating, and also [nickel powder, pewter powder, gold plate nickel powder, and] gold-plated further, (b) Urethane resin, AKURIRUME thymine resin, an epoxy resin, an alkyd resin, The mixed dissolution of 5 - 50 % of the weight of one sort or two sorts of flexible resin chosen from the thermoplastics and thermosetting resin which have the thermal resistance which consists of polyester resin, chloroprene rubber system resin, neoprene system resin, and phenol resin, and the 50 - 95 % of the weight of the organic solvents is carried out. About the electric conduction anisotropy transparence coating mixed conductive impalpable powder (a+b) and homogeneity was made to distribute, it is a process (A). The process which coats the front face of a thermocompression bonding layer, carries out stoving, and prepares a heat-resistant flexibility insulation film layer (A+B), (c) It is a process (A) further to the topmost part of the coat of the bilayer obtained at said process (A+B). The process which coats and carries out stoving of the obtained insulating thermocompression bonding nature transparence coating, and is made into three layer systems (A+B+C), (d) It is formed at said process (A+B+C), has a thermocompression bonding layer in the maximum upper layer, and is further characterized by consisting of the process which cuts the 3 layer-system film which has an electric conduction anisotropy layer and the same thermocompression bonding layer by the desired die-length width method with the maximum upper layer in the lower layer section at a middle lamella.

[0006] Said process (A) Although the thermocompression bonding nature macromolecule binder to be used and which is (**) is selected from the aforementioned resin, NBR special synthetic resin is the rubber compound which carried out optimum dose mixing of the nitrile rubber (NBR) at chloroprene rubber, for example, AM529 (the Amakasu Chemical Industries make, trade name) is raised. As acrylic rubber, there is AM530 (the Amakasu Chemical Industries make, trade name), for example. Moreover, denaturation phenol resin means the phenol resin made from heat curing obtained using the thermoplastic phenol resin or the alkali catalyst acquired using the acid catalyst.

[0007] At less than 5 % of the weight, if the loadings of this thermocompression bonding nature macromolecule binder have the inadequate adhesive strength after thermocompression bonding and 60 % of the weight is exceeded again, since they show insulation also to a cross-section lengthwise direction (the direction of Y), they cannot be used.

[0008] The stability of transparence liquid cannot be used, either being difficult for viscosity's becoming low too much, if the loadings of the solvent of (b) become high too much, it is improper for them since the viscosity of transparence liquid is difficult at the time of coating, and they exceed 90 % of the weight at less than 60 % of the weight, and coating on the contrary, and taking into consideration.

[0009] The thixotropy agent of the silica system of (Ha) is the ultrafine particle high grade anhydrous silica which hydrolyzed tetrachlorosilane in the acid hydrogen flame, and gives a thioxotropy to liquid resin by work of the silanol group which exists in the front face. As this thixotropy agent, there is AEROSIL200 (product made from Japanese Aerosil) etc. The loadings of this thixotropy agent are 0.1. The thixotropy nature of a transparence coating worsens that it is under weight %, it is difficult for coating, and it falls [the thermocompression bonding nature of a transparence coating] and is improper if 10 % of the weight is exceeded.

[0010] Next, if it is difficult for viscosity to pass low that the viscosity of the insulating thermocompression bonding nature transparence coating which consists of the transparence liquid which mixed the thixotropy agent, and was dissolved and obtained is less than 10poise, and to coat and it exceeds 1000poise, it is difficult for viscosity to be too high and to coat. After coating this transparence coating, stoving of it is carried out at the temperature of 90 - 150 ** at a far infrared furnace.

[0011] Said process (B) The above set and used (a) The grain size of conductive impalpable powder is 1.0-40 micrometers. Grain size is 1.0 although considered as the range. mum In the thing of the

following, since it becomes large, and contact resistance stops showing an electric conduction anisotropy and becomes close to an insulation, it is improper. Moreover, 40 micrometers It becomes easy to flow even to a cross-section longitudinal direction (x directions) and is improper what is exceeded.

[0012] The loadings of conductive impalpable powder are 1.0. The variance of impalpable powder decreases that it is under weight %, electrical instability is seen at the time of connection, and it is improper. Moreover, conversely, if 10 % of the weight is exceeded, it is [the distance of between / particles / becomes narrow and / possibility, such as a short circuit,] at the time of distribution, and is improper.

[0013] (b) Flexibility falls and is not desirable, if the coating nature of transparence liquid falls at less than 5 % of the weight and the loadings of ******** resin exceed 50 % of the weight. Moreover, if the viscosity of transparence liquid becomes [the loadings of an organic solvent] high at less than 50 % of the weight, coating nature falls and 95 % of the weight is exceeded, desiccation is difficult, and since coating nature falls, it is not desirable.

[0014]

[Example] With reference to a drawing, an example explains this invention below. The cross section of the 3 layer-system anisotropy electric conduction film member of one example of this invention is shown in drawing 1 , the cross section of the conventional anisotropy electric conduction film member is shown in drawing 2 , and the comparison of structure is displayed.

[0015] In one in a drawing, an insulating thermocompression bonding layer and 3 show a conductive particle, and, as for a mold releasing film (separator) and 2, 4 shows a heat-resistant flexibility insulation film.

[0016] Since the conductive particle was pushed out between terminals with the binder after thermocompression bonding in the conventional anisotropy electric conduction film member, particles short-circuit and a particle drops out also of on a circuit, so that the important section after the thermocompression bonding of the anisotropy electric conduction film member by this invention may be expanded and shown in drawing 3 , the important section after the thermocompression bonding of the conventional anisotropy electric conduction film member may be expanded and shown in drawing 4 and it may see by drawing 3 and drawing 4 . Although there is such instability [like], since the conductive particle is being fixed to the middle lamella, the conventional problem is solved by the 3 layer-system anisotropy electric conduction film member of this invention of drawing 3 . Drawing 5 shows the condition of having connected the flexible printed circuit board with the display by the anisotropy electric conduction film member by one example of this invention. Among a drawing, in a display and 6, the electrode section of liquid crystal display tubing and 7 show a flexible printed circuit board (FPC) (TAB), and 8 shows [five] the anisotropy electric conduction film member of one example.

[0017] the Teflon film top of example 1 separator -- (**) -- 25.5 % of the weight of phenol resin, and (**) -- 74 % of the weight (mixing ratio 1:1:1) of partially aromatic solvents of an isophorone, methyl isobutyl ketone, and a xylene, and the thixotropy agent of a silica (Ha) system -- AEROSIL200 (product [made from Japanese Aerosil], trade name) 0.5 Weight % was coated using the insulating thermocompression bonding transparence coating with a viscosity of 40poise which carried out the mixed (I + RO + Ha) dissolution, and stoving was carried out at the far infrared furnace of 120 ** (process A).

[0018] Next, (a) Grain size of 6-15 micrometers In the end of a resin bead grain which nickel plating was turned up and gold-plated further 2 % of the weight, (b) It is a process (A) about the electric conduction anisotropy transparence coating which made 28 % of the weight of flexible resin of acrylic melamine resin distribute 70 % of the weight of xylenes, and the resin bead which performed plating to mixed (a+b) homogeneity. The front face of the obtained thermocompression bonding layer is coated. Stoving was carried out at the far infrared furnace of 120 ** (process B).

[0019] It is a process (A) further to the topmost part of the coat of the bilayer obtained at said process (A+B). The obtained insulating thermocompression bonding nature transparence coating was coated, stoving was carried out at the far infrared furnace of 120 **, and it considered as three layer systems (process C).

[0020] The film formed at said process (A+B+C) was cut by the desired die-length width method

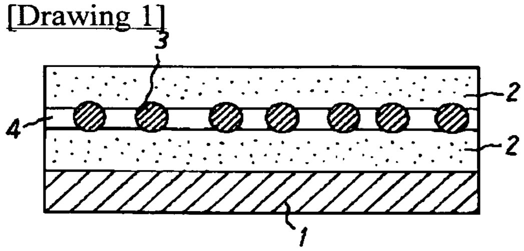
(process D). Thus, the 3 layer-system anisotropy electric conduction film member was obtained.
[0021] an example 2 Teflon film top -- (**) -- 26 % of the weight of epoxy resins, and (**) -- thixotropy agent AEROSIL 200 of 73.5 % of the weight (mixing ratio 1:1:2) of partially aromatic solvents of an isophorone, methyl isobutyl ketone, and a xylene, and a silica (Ha) system 0.5 Weight % was coated using the insulating thermocompression bonding nature transparence coating with a viscosity of 45poise which carried out the mixed (I + RO + Ha) dissolution, and stoving was carried out at the far infrared furnace of 115 ** (process A).
[0022] Next, (a) Grain size of 20-30 micrometers 5 % of the weight of gold plate nickel powder, and (b) It is a process (A) about the electric conduction anisotropy transparence coating 25 % of the weight of flexible resin of urethane resin was made to distribute to 70 % of the weight of methyl ethyl ketones, and the above-mentioned end of a gold plate nickel grain and mixed (a+b) homogeneity. The front face of a thermocompression bonding layer was coated and stoving was carried out at the far infrared furnace of 115 ** (process B).
[0023] It is a process (A) further to the topmost part of the coat obtained at said process (A+B). The obtained insulating thermocompression bonding nature transparence coating was coated, stoving was carried out at the far infrared furnace of 115 **, and it considered as three layer systems (process C).
[0024] The film formed at said process (A+B+C) was cut by the desired die-length width method (process D). In this way, the 3 layer-system anisotropy electric conduction film member was able to be obtained.
[0025] an example 3 Teflon film top -- (**) -- AM527 (Amakasu Chemical Industries make, trade name) 23.5 % of the weight and (**) -- thixotropy agent AEROSIL 200 of 76 % of the weight of partially aromatic solvents of an isophorone, methyl butyl ketone, and a xylene (mixing ratio 1:2:2), and a silica (Ha) system 0.5 Weight % was coated using the insulating thermocompression bonding nature transparence coating with a viscosity of 40poise which carried out the mixed (I + RO + Ha) dissolution, and stoving was carried out at the far infrared furnace of 115 ** (process A).
[0026] Next, (a) Grain size of 6-15 micrometers 5 % of the weight of resin bead powder which turned nickel plating up and gold-plated further, (b) To 30 % of the weight of flexible resin which consists of an alkyd resin, 65 % of the weight of methyl isobutyl ketone, About the electric conduction anisotropy transparence coating above-mentioned resin bead powder and above-mentioned mixed (a+b) homogeneity were made to distribute, it is a process (A). The front face of a thermocompression bonding layer was coated and stoving was carried out at the far infrared furnace of 115 ** (process B).
[0027] It is a process (A) further to the topmost part of the coat obtained at said process (A+B). The obtained insulating thermocompression bonding nature transparence coating was coated, stoving was carried out at the far infrared furnace of 115 **, and it considered as three layer systems (process C).
[0028] The film formed at said process (A+B+C) was cut by the desired die-length width method (process D). Thus, the same 3 layer-system anisotropy electric conduction film as an example 1 was able to be obtained.
[0029] an example 4 Teflon film top -- (**) -- 25 % of the weight of polyester resin, and (**) -- thixotropy agent AEROSIL 200 of 74 % of the weight (1.5 : mixing-ratio 1.5 : 2) of partially aromatic solvents of an isophorone, methyl isobutyl ketone, and a xylene, and a silica (Ha) system 1.0 The insulating thermocompression bonding nature transparence coating with a viscosity of 50poise which carried out the mixed (I + RO + Ha) dissolution of the weight % was coated, and stoving was carried out at the far infrared furnace of 110 ** (process A).
[0030] Next, (a) Grain size of 10-20 micrometers 10 % of the weight of pewter powder, and (b) It is a process (A) about the electric conduction anisotropy transparence coating 25 % of the weight of flexible resin which consists of acrylic melamine resin was made to distribute to 65 % of the weight of toluene, and above-mentioned pewter powder and above-mentioned mixed (a+b) homogeneity. The front face of a thermocompression bonding layer was coated and stoving was carried out at the far infrared furnace of 110 ** (process B).
[0031] The process not more than it was able to obtain the 3 layer-system anisotropy electric conduction film member by the same approach as an example 1 and ****.
[0032]
[Effect of the Invention] the thing of one layer system to which the 3 layer-system anisotropy electric

conduction film member obtained by the approach of this invention distributed the conductive particle to the conventional binder -- comparing -- the layer of a conductive particle -- independently -- existing -- **** -- in addition -- and in the resin hardened in the shape of a flexible film, homogeneity distributes and the conductive particle is being fixed independently, respectively. Moreover, the insulating thermocompression bonding layer is formed in the vertical layer. Therefore, since it is fixed like before at the time of heating application of pressure, without a conductive particle flowing with a binder, when connecting highly minute circuits, such as a fine pitch, the anxiety of omission of the conductive particle from a connection terminal area, leak, and a cross talk can be canceled, and it can paste up firmly with the binder of the vertical layer which flowed, and higher insulation resistance can be realized. The shape of the pitch of a connection terminal and surface type is not chosen, but electric and mechanical-connections dependability further stabilized from before are acquired from the above descriptions, and much more good and positive effectiveness is seen according to a fine pitch member response.

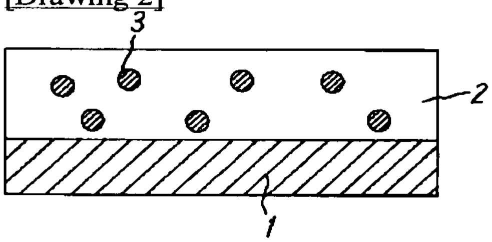
[Translation done.]

DRAWINGS

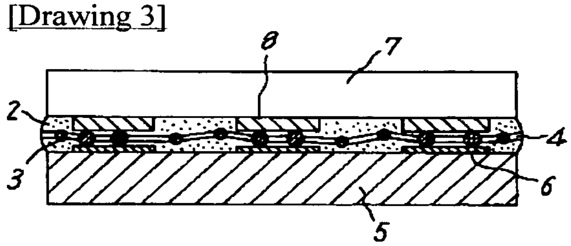
[Drawing 1]



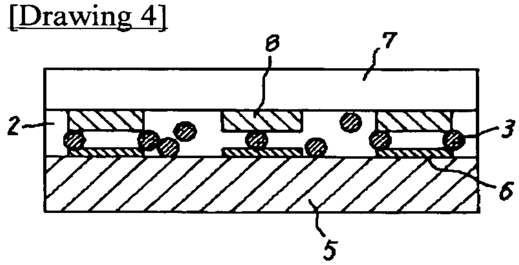
[Drawing 2]



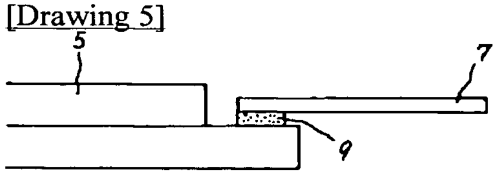
[Drawing 3]



[Drawing 4]



[Drawing 5]



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(71)出願人　000231202
日本黒鉛工業株式会社
滋賀県大津市唐橋町９番22号

(72)発明者　村田　勝弘
滋賀県大津市田上里町90

(72)発明者　芝田　光正
滋賀県草津市南笠町311

(72)発明者　畠山　徹
滋賀県草津市草津三丁目４－２

(72)発明者　磯野　忠昭
滋賀県大津市大平二丁目６－55

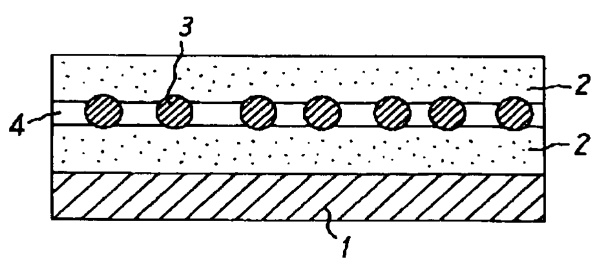
(74)代理人　弁理士　杉村　暁秀　（外５名）

(54)【発明の名称】　三層構造異方性導電膜部材の製造方法

(57)【要約】

【目的】　従来の異方性導電膜より更に品質並びに信頼性に優れた異方性導電膜部材の製造方法を得る。

【構成】　(A) フッ素系の離型フィルム１の表面に、（イ）熱圧着性高分子結合剤５～６０重量％と、（ロ）溶剤６０～９０重量％と、（ハ）シリカ系チキソトロピー剤0.1 ～1.0 重量％とを混合溶解せしめて粘度１０～1000ポイズの透明液から成る絶縁熱圧着性透明塗料をコーティングし、加熱、乾燥して絶縁熱圧着層２を設ける工程と、(B)(a)粒度1.0 ～４０μm の導電性微粉末３ 1.0～１０重量％と、(b) 可撓性樹脂５～５０重量％と有機溶剤５０～９５重量％を混合溶解し、導電性微粉末を混合し均一に分散させた導電異方性透明塗料を工程(A) の熱圧着層の表面にコーティングし、加熱、乾燥して耐熱可撓性絶縁フィルム４を設ける工程と、(C) 得られた二層の塗膜層の最上部に前記絶縁熱圧着性透明塗料をコーティングし、加熱乾燥する工程と、(D) 得られた三層構造フィルムを所望の大きさに切断する工程から成る。



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【特許請求の範囲】

【請求項１】　電子部品接続端子側面と、もう一方の回路基板電極端子側面とを電気的・機械的に接続するための導電性粒子を分散せしめた粘着性の三層構造異方性導電膜部材を製造するに当り、

(A) フッ素系の離型フィルムの上に、

（イ）フェノール樹脂、エポキシ樹脂、シリコーン樹脂、ＮＢＲ特殊合成樹脂、アクリル樹脂、ポリエステル樹脂、変性フェノール樹脂およびスチレンブタジエンゴムからなる群から選ばれた１種又は２種から成る熱圧着性高分子結合剤５～６０重量％と、

（ロ）イソホロン、ジアセトンアルコール、メチルイソブチルケトン、キシレン、トルエン、ジエチルカルビトール及びセロソルブアセテートからなる熱硬化性樹脂および熱可塑性樹脂から選ばれた１種又は２種以上の溶剤６０～９０重量％と、

（ハ）シリカ系のチキソトロピー剤0.1 ～1.0 重量％とを混合（イ＋ロ＋ハ）溶解せしめた粘度１０～1000ポイズの透明液から成る絶縁熱圧着性透明塗料をコーティングし、加熱乾燥して絶縁熱圧着層を設ける工程と、

(B) (a) 粒度1.0 ～４０μｍ の黒鉛粉末、銀粉末、銅粉末、ニッケル粉末、金メッキニッケル粉末、ハンダ粉末およびニッケルメッキした上にさらに金メッキを施した樹脂ビーズ粉末から成る群から選ばれた１種又は２種以上の導電性微粉末1.0 ～１０重量％と、(b) ウレタン樹脂、アクリルメラミン樹脂、エポキシ樹脂、アルキッド樹脂、ポリエステル樹脂、クロロプレンゴム系樹脂、ネオプレン系樹脂およびフェノール樹脂からなる耐熱性を有する熱可塑性樹脂及び、熱硬化性樹脂から選ばれた１種または２種の可撓性樹脂５～５０重量％と、有機溶剤５０～９５重量％を混合溶解し、導電性微粉末と混合（ａ＋ｂ）均一に分散せしめた導電異方性透明塗料を工程(A) の熱圧着層の表面にコーティングし、加熱乾燥して耐熱可撓性絶縁フィルム層を設ける工程（Ａ＋Ｂ）と、(c) 前記工程（Ａ＋Ｂ）で得られた二層の塗膜層の最上部に更に、工程(A)で得られた絶縁熱圧着性透明塗料をコーティングし、加熱乾燥し、三層構造とする工程（Ａ＋Ｂ＋Ｃ）と、(d) 前記工程（Ａ＋Ｂ＋Ｃ）にて形成され最上層に熱圧着層を有し、中層に導電異方性層、更にその下層部に最上層と同じ熱圧着層を有する三層構造フィルムを、所望の長さ幅寸法に切断する工程から成ることを特徴とする三層構造異方性導電膜部材の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、液晶パネル、プラズマディスプレイ、サーマルヘッド、メンブレンスイッチ等の電子素子の電極部分及び、プリント回路基板端子部分をそれぞれと対向する各端子部分に、機械的並びに電気的に多数の端子を一括して接続するための、所望の長さおよび幅寸法を有する三層構造異方性導電膜部材の製造方法に関するものである。

2

【０００２】

【従来の技術】従来の異方性導電膜の製造方法としては、バインダーである絶縁熱圧着性透明塗料の中に導電性微粒子を混合、均一に分散せしめたものを、セパレーターである離型フィルムの表面にコーティングし、加熱乾燥後、異方性導電膜を形成し、所望の長さおよび幅寸法に切断する方法がある。

【０００３】

【発明が解決しようとする課題】従来の異方性導電膜は、接着性フィルム（バインダー）中に導電性粒子を分散させたもので、これを接続しようとする端子間に挟み、上下の端子の位置を合わせ加熱、加圧する。上下の端子間ではフィルムを形成しているバインダーが流動し、押し出され、上下の端子間が挟まり導電粒子と接触し導通するという以上のようなものが用いられてきたが、従来のものでは、加熱加圧時にバインダーと同様に導電性粒子までもが流動してしまい、ファインピッチなどの高精細回路を接続する場合において、接続端子部分からの導電性粒子の脱落（接続端子部分の形状によるものを含む）、またそれによる不安定粒子数の為、接続抵抗値のバラツキ、上昇或いはリーク、クロストークなどの障害が懸念され、解決すべき課題として残されている。従って本発明の目的は、以上のような課題を解決し、従来の異方性導電膜より更に品質並びに信頼性に優れた異方性導電膜部材の製造方法を提供することにある。

【０００４】

【課題を解決するための手段】本発明の三層構造異方性導電膜部材の製造方法は、先ず、図面にも見られるように、

(A) セパレーターであるフッ素系の離型フィルム、例えば２５μｍ ～125 μｍ の四フッ化エチレンフィルムまたはトヨフロンフィルムの表面に、

（イ）フェノール樹脂、エポキシ樹脂、シリコーン樹脂、ＮＢＲ特殊合成樹脂、アクリル樹脂、ポリエステル樹脂、変性フェノール樹脂およびスチレンブタジエンゴム（ＳＢＲ）からなる熱硬化性樹脂および熱硬化性樹脂から選ばれた１種又は２種の熱圧着性高分子結合剤５～６０重量％と、

（ロ）イソホロン、ジアセトンアルコール、メチルイソブチルケトン、キシレン、トルエン、ジエチルカルビトール及びセロソルブアセテートから成る群から選ばれた１種又は２種以上の溶剤６０～９０重量％と、

（ハ）シリカ系のチキソトロピー剤0.1 ～1.0 重量％とを混合（イ＋ロ＋ハ）し溶解せしめた粘度１０～1000ポイズの透明液から成る絶縁熱圧着性透明塗料をコーティングし、加熱乾燥して絶縁熱圧着層を設ける工程と、

【０００５】(B)(a)粒度1.0 ～４０μｍ の黒鉛粉末、銀

粉末、銅粉末、ニッケル粉末、ハンダ粉末、金メッキニッケル粉末およびニッケルメッキした上にさらに金メッキを施した樹脂ビーズ粉末から成る群から選ばれた１種又は２種以上の導電性微粉末1.0 ～１０重量％と、(b) ウレタン樹脂、アクリルメチミン樹脂、エポキシ樹脂、アルキッド樹脂、ポリエステル樹脂、クロロプレンゴム系樹脂、ネオプレン系樹脂およびフェノール樹脂からなる耐熱性を有する熱可塑性樹脂および熱硬化性樹脂から選ばれた１種又は２種の可撓性樹脂５～５０重量％と有機溶剤５０～９５重量％を混合溶解し、導電性微粉末を混合（ａ＋ｂ）し均一に分散せしめた導電異方性透明塗料を、工程(A) の熱圧着層の表面にコーティングし、加熱乾燥して耐熱可撓性絶縁フィルム層を設ける工程（Ａ＋Ｂ）と、(c)前記工程（Ａ＋Ｂ）で得られた二層の塗膜層の最上部に更に、工程(A) で得られた絶縁熱圧着性透明塗料をコーティングし、加熱乾燥し、三層構造とする工程（Ａ＋Ｂ＋Ｃ）と、(d)前記工程（Ａ＋Ｂ＋Ｃ）にて形成され最上層に熱圧着層を有し、中層に導電異方性層、更に、その下層部に最上層と同じ熱圧着層を有する三層構造フィルムを、所望の長さ幅寸法に切断する工程から成ることを特徴とする。

【０００６】前記工程(A) で用いる（イ）の熱圧着性高分子結合剤は、前記の樹脂中から選定されるが、この内ＮＢＲ特殊合成樹脂とは、クロロプレンゴムにニトリルゴム（ＮＢＲ）を適量混合したゴム配合物で、例えばＡＭ５２９（甘糟化学産業（株）製、商品名）があげられる。アクリルゴムとしては、例えばＡＭ５３０（甘糟化学産業（株）製、商品名）がある。また、変性フェノール樹脂とは、酸触媒を用いて得られた熱可塑性フェノール樹脂またはアルカリ触媒を用いて得られた熱硬化製フェノール樹脂を言う。

【０００７】該熱圧着性高分子結合剤の配合量は５重量％未満では、熱圧着後の接着力が不十分であり又６０重量％を越えると、断面縦方向（Ｙ方向）に対しても絶縁性を示してしまうので使用不可である。

【０００８】（ロ）の溶剤の配合量が６０重量％未満では透明液の粘度が高くなりすぎてコーティング時に困難であるので不可であり、９０重量％を越えると粘度が低くなりすぎて、かえってコーティングするのに困難であり、また、透明液の安定性も考慮して使用不可である。

【０００９】（ハ）のシリカ系のチキソトロピー剤は、四塩化ケイ素を酸水素焔中にて加水分解した超微粒子高純度無水シリカで、その表面に存在するシラノール基の働きにより揺変性を液体樹脂に付与する。かかるチキソトロピー剤としてはＡＥＲＯＳＩＬ２００（日本アエロジル（株）製）等がある。該チキソトロピー剤の配合量は0.1 重量％未満であると透明塗料のチキソトロピー性が悪くなり、コーティングするのに困難であり、又１０重量％を越えると透明塗料の熱圧着性が低下し不可である。

【００１０】次にチキソトロピー剤を混合し溶解して得た透明液から成る絶縁熱圧着性透明塗料の粘度が１０ポイズ未満であると粘度が低くすぎてコーティングするのが困難であり、又1000ポイズを越えると粘度が高すぎてコーティングするのが困難である。該透明塗料はコーティングした後例えば遠赤炉で９０～150 ℃の温度で加熱乾燥する。

【００１１】前記工程(B) において使用する上記(a) の導電性微粉末の粒度は、1.0 ～４０μｍ の範囲とするが、粒度が1.0 μｍ 未満のものでは接触抵抗が大きくなり、導電異方性を示さなくなり、絶縁に近くなるので不可である。また４０μｍ を越えるものでは、断面横方向（ｘ方向）に対してでも導通しやすくなり不可である。

【００１２】導電性微粉末の配合量は1.0 重量％未満であると微粉末の分散量が少なくなり、接続時に電気的不安定性がみられ不可である。又逆に、１０重量％を越えると分散時に粒子間同士の距離がせまくなりショートなどの可能性があり不可である。

【００１３】(b) の可撓性樹脂の配合量が５重量％未満では透明液のコーティング性が低下し、５０重量％を越えると可撓性が低下して好ましくない。また、有機溶剤の配合量が５０重量％未満では、透明液の粘度が高くなりコーティング性が低下し、９５重量％を越えると乾燥が困難であり、コーティング性が低下するので好ましくない。

【００１４】

【実施例】以下図面を参照して本発明を実施例により説明する。図１に本発明の一実施例の三層構造異方性導電膜部材の断面を示し、図２に従来の異方性導電膜部材の断面を示し、構造の比較を表示する。

【００１５】図面中１は離型フィルム（セパレーター）、２は絶縁熱圧着層、３は導電性粒子、４は耐熱可撓性絶縁フィルムを示す。

【００１６】図３に本発明による異方性導電膜部材の熱圧着後の要部を拡大し示し、図４に従来の異方性導電膜部材の熱圧着後の要部を拡大し示し、図３および図４でみられるように従来の異方性導電膜部材では、熱圧着後に導電性微粒子がバインダーとともに端子間に押しだされた為、粒子同士がショートし、又、回路上からも粒子が脱落する。これらのような不安定性があるが、図３の本発明の三層構造異方性導電膜部材では、導電性微粒子が中層に固定されているので従来の問題が解決される。図５は、本発明の一実施例による異方性導電膜部材によりディスプレイと可撓性プリント基板を接続した状態を示す。図面中、５はディスプレイ、６は液晶表示管の電極部分、７は可撓性プリント基板（ＦＰＣ）（ＴＡＢ）、８は一実施例の異方性導電膜部材を示す。

【００１７】実施例１

セパレーターのテフロンフィルムの上に、（イ）フェノール樹脂25.5重量％、（ロ）イソホロン、メチルイソブ

チルケトン、キシレンの混合溶剤（混合比１：１：１）７４重量％、（ハ）シリカ系のチキソトロピー剤ＡＥＲＯＳＩＬ２００（日本アエロジル（株）製、商品名）0.5 重量％とを混合（イ＋ロ＋ハ）溶解した粘度４０ポイズの絶縁熱圧着透明塗料を用いてコーティングし、120 ℃の遠赤炉にて加熱乾燥した（工程Ａ）。

【００１８】次に、(a) 粒度６～１５μｍ のニッケルメッキした上にさらに金メッキを施した樹脂ビーズ粒末２重量％と、(b) アクリルメラミン樹脂の可撓性樹脂28重量％に、キシレン７０重量％とメッキを施した樹脂ビーズとを混合（ａ＋ｂ）均一に分散せしめた導電異方性透明塗料を工程(A) で得た熱圧着層の表面にコーティングし、120 ℃の遠赤炉にて加熱乾燥した（工程Ｂ）。

【００１９】前記工程（Ａ＋Ｂ）で得られた二層の塗膜層の最上部に更に、工程(A) で得られた絶縁熱圧着性透明塗料をコーティングし、120 ℃の遠赤炉にて加熱乾燥し、三層構造とした（工程Ｃ）。

【００２０】前記工程（Ａ＋Ｂ＋Ｃ）にて形成されたフィルムを、所望の長さ幅寸法に切断した（工程Ｄ）。このようにして、三層構造異方性導電膜部材を得た。

【００２１】実施例２

テフロンフィルムの上に、（イ）エポキシ樹脂２６重量％、（ロ）イソホロン、メチルイソブチルケトン、キシレンの混合溶剤（混合比１：１：２）73.5重量％、（ハ）シリカ系のチキソトロピー剤ＡＥＲＯＳＩＬ２００　0.5 重量％とを混合（イ＋ロ＋ハ）溶解した粘度４５ポイズの絶縁熱圧着性透明塗料を用いてコーティングし、115 ℃の遠赤炉にて加熱乾燥した（工程Ａ）。

【００２２】次に、(a) 粒度２０～３０μｍ の金メッキニッケル粉末５重量％と、(b) ウレタン樹脂の可撓性樹脂２５重量％にメチルエチルケトン７０重量％と、上記の金メッキニッケル粒末と混合（ａ＋ｂ）均一に分散せしめた導電異方性透明塗料を、工程(A) の熱圧着層の表面にコーティングし、115 ℃の遠赤炉にて加熱乾燥した（工程Ｂ）。

【００２３】前記工程（Ａ＋Ｂ）で得られた塗膜層の最上部に更に工程(A) で得られた絶縁熱圧着性透明塗料をコーティングし、115 ℃の遠赤炉にて加熱乾燥し、三層構造とした（工程Ｃ）。

【００２４】前記工程（Ａ＋Ｂ＋Ｃ）にて形成されたフィルムを所望の長さ幅寸法に切断した（工程Ｄ）。こうして、三層構造異方性導電膜部材を得ることができた。

【００２５】実施例３

テフロンフィルムの上に、（イ）ＡＭ５２７（甘糟化学産業（株）製、商品名）23.5重量％、（ロ）イソホロン、メチルブチルケトン、キシレン（混合比１：２：２）の混合溶剤７６重量％、（ハ）シリカ系のチキソトロピー剤ＡＥＲＯＳＩＬ２００　0.5 重量％とを混合（イ＋ロ＋ハ）溶解した粘度４０ポイズの絶縁熱圧着性透明塗料を用いてコーティングし、115 ℃の遠赤炉にて加熱乾燥した（工程Ａ）。

【００２６】次に、(a) 粒度６～１５μｍ のニッケルメッキした上に更に金メッキを施した樹脂ビーズ粉末５重量％と、(b) アルキッド樹脂からなる可撓性樹脂30重量％にメチルイソブチルケトン65重量％と、上記の樹脂ビーズ粉末と混合（ａ＋ｂ）均一に分散せしめた導電異方性透明塗料を、工程(A) の熱圧着層の表面にコーティングし、115 ℃の遠赤炉にて加熱乾燥した（工程Ｂ）。

【００２７】前記工程（Ａ＋Ｂ）で得られた塗膜層の最上部に更に、工程(A) で得られた絶縁熱圧着性透明塗料をコーティングし、115 ℃の遠赤炉にて加熱乾燥し、三層構造とした（工程Ｃ）。

【００２８】前記工程（Ａ＋Ｂ＋Ｃ）にて形成されたフィルムを所望の長さ幅寸法に切断した（工程Ｄ）。このようにして、実施例１と同様の三層構造異方性導電膜を得ることができた。

【００２９】実施例４

テフロンフィルムの上に（イ）ポリエステル樹脂２５重量％、（ロ）イソホロン、メチルイソブチルケトン、キシレンの混合溶剤（混合比1.5 ：1.5 ：２）７４重量％、（ハ）シリカ系のチキソトロピー剤ＡＥＲＯＳＩＬ２００　1.0 重量％とを混合（イ＋ロ＋ハ）溶解した粘度５０ポイズの絶縁熱圧着性透明塗料をコーティングし、110 ℃の遠赤炉にて加熱乾燥した（工程Ａ）。

【００３０】次に(a) 粒度１０～２０μｍ のハンダ粉末１０重量％と、(b) アクリルメラミン樹脂からなる可撓性樹脂２５重量％にトルエン６５重量％と、上記のハンダ粉末と混合（ａ＋ｂ）均一に分散せしめた導電異方性透明塗料を工程(A) の熱圧着層の表面にコーティングし、110 ℃の遠赤炉にて加熱乾燥した（工程Ｂ）。

【００３１】それ以下の工程は、実施例１と略々同様な方法にて、三層構造異方性導電膜部材を得ることができた。

【００３２】

【発明の効果】本発明の方法で得られた三層構造異方性導電膜部材は、従来のバインダーに導電性粒子を分散した一層構造のものと比べ、導電性粒子の層が独立して存在しており、なおかつ可撓性フィルム状に硬化された樹脂の中に導電性粒子が均一に分散されそれぞれ独立して固定されている。また、その上下層には、絶縁性熱圧着層が形成されている。したがって、従来のように加熱加圧時に、バインダーと共に導電性粒子が流動することなく固定されている為、ファインピッチなどの高精細回路を接続する場合において、接続端子部からの導電性粒子の脱落やリーク、クロストークの不安が解消され、流動した上下層のバインダーにより強固に接着されより高い絶縁抵抗を実現することができる。以上のような特徴から、接続端子のピッチ、表面形状を選ばず、従来よりさらに安定した電気的・機械的接続信頼性を得て、ファインピッチ部材対応により一層良好かつ確実な効果が見ら

れる。

【図面の簡単な説明】

【図１】本発明の一実施例の異方性導電膜部材を拡大して示す模式断面図である。

【図２】従来の異方性導電膜部材を拡大して示す模式断面図である。

【図３】本発明による異方性導電膜部材の熱圧着後の要部を拡大して示す模式断面図である。

【図４】従来の異方性導電膜部材の熱圧着後の要部を拡大して示す模式断面図である。

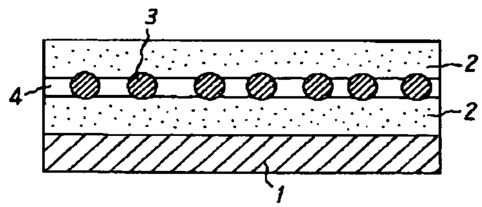
【図５】本発明による異方性導電膜部材の一使用例を示＊

＊す側面図である。

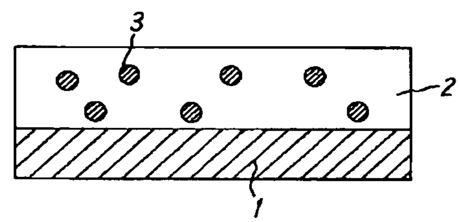
【符号の説明】

1　セパレーター（離型フィルム）
2　絶縁熱圧着層
3　導電性粒子
4　耐熱可撓性絶縁フィルム
5　各種のディスプレイ
6　液晶表示管の電極部分
7　ＦＰＣ（ＴＡＢ）
8　ＦＰＣ（ＴＡＢ）の端子部分
9　本発明の一実施例による異方性導電膜部材

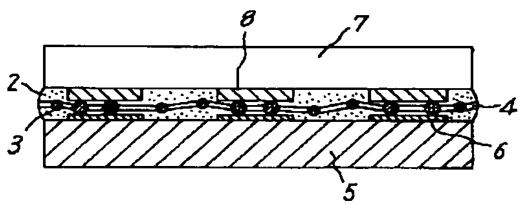
【図１】



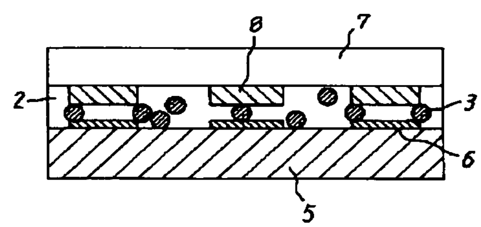
【図２】



【図３】



【図４】



【図５】